



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/574,253	03/30/2006	Hideo Morimoto	07700072001	9066
22511	7590	04/08/2008	[REDACTED]	EXAMINER
OSHA LIANG L.L.P. 1221 MCKINNEY STREET SUITE 2800 HOUSTON, TX 77010			[REDACTED]	PATEL, PUNAM
			[REDACTED]	ART UNIT
				PAPER NUMBER
			2855	
			[REDACTED]	NOTIFICATION DATE
				DELIVERY MODE
			04/08/2008	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@oshaliang.com  
buta@oshaliang.com

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/574,253	MORIMOTO, HIDEO	
	<b>Examiner</b>	<b>Art Unit</b>	
	PUNAM PATEL	2855	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 01 February 2008.

2a) This action is FINAL.                    2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1,2 and 7-12 is/are pending in the application.

4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

5) Claim(s) 2 is/are allowed.

6) Claim(s) 1 and 9-12 is/are rejected.

7) Claim(s) 7 and 8 is/are objected to.

8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on 30 March 2006 is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All    b) Some \* c) None of:

1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____ .
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)	5) <input type="checkbox"/> Notice of Informal Patent Application
Paper No(s)/Mail Date _____ .	6) <input type="checkbox"/> Other: _____ .

## **DETAILED ACTION**

### ***Drawings***

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the “operation body” of claim 12 must be shown or the feature(s) canceled from the claim(s). It is unclear as to what this structural element looks like/comprises. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 1 and 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takeuchi et al. (US 5,959,209) in view of Wiley (*Wiley Encyclopedia of Electrical and Electronics Engineering: Strain Sensors*, © 1999 pp 566-580).**

With respect to Claim 1, Takeuchi et al. teach a multi-axial sensor unit and the of the multi-axial sensor units disposed on a common plane (col. 10: 31-26) around a center point at regular angular intervals at the same direction from the center point, wherein each multi-axial sensor unit is operable to measure inertial forces (col. 1: 15). Each three-axis sensor unit (see Figs. 10 and 17 & col. 9: 45-54) comprises:

eight piezoelectric strain gauges (#21, the X and Y gauges) disposed on a single plane;  
a strain generation body comprising a force receiving portion (#10) provided at a center, a fixed portion (11) provided on an outer circumference, and an annular diaphragm portion (#12) connecting the force receiving and fixed portions to each other;

four of the strain gauges are disposed on a line perpendicular to a center line (Fig. 17, understood to be coming out of the plane) of the diaphragm (Fig. 17, the strain gauges, #21 on the Y axis, wherein two are closer to the center portion, #10 and two are positioned on an outer edge of the diaphragm, #12); and

four of the eight strain gauges are disposed on a line perpendicular to the line perpendicular to the center line of the diaphragm (Fig. 17, the strain gauges, #21 on the X axis, wherein two are closer to the center portion, #10 and two are positioned on an outer edge of the diaphragm, #12), thus totaling the eight strain gauges.

However, Takeuchi et al. fail to teach the piezoelectric strain gauges being piezoresistive and the eight strain gauges being connected in one bridge circuit.

Wiley teaches that strain gauges based on piezoresistive effect are preferred over piezoelectric type strain sensors in static strain measurements and overall can perform with better accuracy and stability over a prolonged period of time (page 3). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the three-axis sensor unit of Takeuchi et al. by replacing the piezoelectric strain gauges with piezoresistive type strain gauges since they will provide a better performing long-term sensor (Wiley, page 3)

The encyclopedia further teaches that the Wheatstone bridge is one of the most common configurations used with strain gauges (page 5). JP-4-194634 (see Applicant's IDS filed on 03/30/2006) teaches/provides an example of a similar multi-axial sensor unit, wherein the eight strain gauges have been connected in a single Wheatstone bridge configuration (Figs. 2, 3, and 7). It would have been obvious to one of ordinary skill in the art at the time of the invention to connect all (eight) the strain gauges in a Wheatstone bridge circuit since it is a notoriously well known electrical configuration for strain gauges in the art (Wiley, page 5).

With respect to Claim 9, Takeuchi et al. teach the angular interval appears to be 120° (Fig. 27).

With respect to Claim 10, Takeuchi et al. teach a line (understood to be imaginary and horizontal) extending through a center point of the multi-axial sensor (understood to be the center of the rectangle) and a center point of each multi-axial sensor unit (#s 24, only the two located at the two opposing edges of the rectangle, wherein these two are equally spaced from a center point on the rectangle/overall sensor plane). See Fig. 26. Takeuchi et al. teach that the multi-axial sensor units (#s 24) of Fig. 26 maybe of the type disclosed in Fig. 17. (col. 9: 45-57, wherein the x-axis of the two sensors are understood to be on the line extending through the center points, and the y-axis is read as the line perpendicular to the line extending through the center points).

With respect to Claim 11, Takeuchi et al. teach the sensor comprising a first member (Fig. 34b, wherein the top layer comprising the multi-axial sensor units is read as the first member) and a second member (wherein the middle/bottom layer comprising the strain generation bodies, #s 65 and 67, is read as the second member). The second member has not strain gauges and the strain generation bodies are integral with the first member, such that forces/moment effecting, #s 65 and 67 are measured by the strain gauges. See col. 14: 31-45.

With respect to Claim 12, Takeuchi et al. teach a weight/force acting on the force receiving portion (#10) that allows the apparatus to measure multi-axial accelerations. See Fig. 2.

***Response to Arguments***

Applicant's arguments with respect to claims 1-6 have been considered but are moot in view of the new ground(s) of rejection.

***Allowable Subject Matter***

The indicated allowability of claim 9 is withdrawn in view of the newly discovered reference to **Takeuchi et al. (US 5,959,209)**.

Claim 2 is allowed. Claims 7 and 8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter:

With respect to Claim 2, while the prior art generally teaches connecting the strain gauges in Wheatstone bridge circuits, the prior art fails to provide reasonable support for modifying the multi-axial sensor of Takeuchi et al., by connecting eight strain gauges in two Wheatstone bridge circuits of each individual multi-axial sensor unit.

With respect to Claim 7, one with ordinary skill in the art would not be motivated to modify the multi-axial sensor unit of Takeuchi et al. to include at least four multi-axial sensor units, such that they are arranged with an angular spacing of 90°, since the multi-axial sensor of Takeuchi et al. is arranged to provide a three-axis sensor (consisting of three multi-axial sensor units). Claim 8 depends on claim 7.

***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following prior art teaches multi-axial sensors wherein in a plurality of multi-axial sensor units utilizing piezoresistive gauges have been arranged on a single plane: Kurtz (US 6,642,594) and Takeuchi et al. (US 5,948,996).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PUNAM PATEL whose telephone number is (571)272-6794. The examiner can normally be reached on Monday to Friday 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on (571) 272-2180. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Edward Lefkowitz/  
Supervisory Patent Examiner, Art Unit 2855

PP  
04/02/2008

Application/Control Number: 10/574,253

Art Unit: 2855

Page 8